Early warning signs of failure in offshore outsourced software project – an indo-german case study

Philip, Tom ; Wende, Erik

Early Warning Signs of Failure in Offshore Outsourced Software Project – An Indo-German Case Study

Research-in-Progress Paper

Tom Philip and Erik Wende
Department of Informatics
University of Zurich
Switzerland
E-mails: {philip, wende} at ifi.uzh.ch

Abstract

Due to the cultural and linguistic differences, different time zones, and complexities of knowledge transfer involved in IT offshoring, offshore-outsourced projects are more prone to failure than in-house and domestically outsourced projects. These inherent risks exacerbate the communication, coordination and collaboration between vendors and clients and thus affect various stages of the offshore outsourced software development (OOSD). Several academic and practitioner studies have reported about the failed offshore projects. Although there is no silver bullet to overcome the inherent risks, the postmortem examination of failed projects has shown that long before the failure there were significant symptoms or early warning signs (EWS) of trouble. An EWS can be defined as an event or indication that predicts or cautions one of possible or impending problems in the first 20 % of the project's cooperation or collaboration period between clients and vendors. These signs become more significant in the unique onshore-offshore environment, where the risks are higher and there is a need for an early warning mechanism that helps to avoid failures. We analyze a failed project case that involved an Indo-German OOSD contractual arrangement for a web development project in this work. Based on explorative, in-depth case study, we identify the EWSs of failure and develop a preliminary model to understand the failures. Although this study is based on just one case study, it provided exclusive insights from both vendor and client perspectives to study the EWSs from a team perspective and to understand the interrelations between the EWS categories.

1. Introduction

Software development has taken a significant portion of the market share in IT offshoring since software coding is an activity that can be dispersed ideally across the globe (Apte and Mason 1995). Offshore software development is also expected to experience continuous growth in the foreseeable future. However, complexity and uncertainty of the nature of software development project make it vulnerable to failure (Hoch et al. 2000). Success remains rare for software projects as they are difficult to manage even in conditions of co-location and proximity. Due to offshore-specific risks such as the cultural and linguistic differences, different time zones, and complexities of knowledge transfer involved in IT offshoring (Sahay et al., 2003; Heeks et al., 2001; Dibbern et al., 2008), offshore-outsourced projects are more prone to failure than in-house and domestically outsourced projects (Nakatsu and Iacovou 2009). These inherent risks exacerbate the communication, coordination and collaboration between vendors and clients and thus affect various stages of the offshore outsourced software development (OOSD). Several

academic and practitioner studies have reported about the failed offshore projects. Since 50% of the offshore projects reportedly fail to reduce costs because of improper management (Vashistha and Vashistha 2006), the original intentions of offshore outsourcing has been questioned.

Although there is no silver bullet to overcome the inherent risks and thus the poor performance of software projects (Brooks 1986), the postmortem examination of failed projects has shown that long before the failure there were significant symptoms or early warning signs (EWS) of trouble. *We define EWS as an event or indication that predicts or cautions one of possible or impending problems in the first 20 % of the project's cooperation or collaboration period between clients and vendors* (adapted from Kappelman et al. 2006). Patients with heart trouble might list problems such as chest pain, numbness in the left arm as classical symptoms prior to a heart attack (Ward, 2003). However, these symptoms may be too late to treat or they may be late warning signs. For effective prevention of heart trouble, early symptoms such as high blood pressure or high cholesterol levels should be checked (Ward, 2003). As in the above medical analogy, the early symptoms or warning signs that are known from the previous IT project experiences can be leveraged for better project outcomes. These signs become more significant in the unique onshore-offshore environment, where the risks are higher and there is a need for an early warning mechanism that helps to avoid failures. The lack of failure research in IS outsourcing also calls for research into failed projects.

The concept of EWSs offers an instrument to reduce the failure rates in offshore projects. The concept of project failure is a vague one and few people agree on its exact definition (Pinto and Mantel, 1990). IT projects can be judged from the implementation and operations perspective and from the project development perspective. This research work has adopted the project development perspective to analyze the failure processes before the system gets implemented. *We define offshore software development project failure as the cancellation of the offshore software development project resulting in premature termination of contractual activities between clients and vendors before the information system becomes operational.* The failure to deliver information system can happen at any development phase before the system becomes operational. Cancellations of offshore software development projects that have client and vendor team members that work at offshore and onshore sites can result from several project internal and external factors.

We explore a real failed project in this research and analyze the EWSs of failures of OOSD projects in this exploratory work. We further analyze the issues leading to the EWSs of failures.

2. Related literature

The concept of EWS in OOSD projects requires knowledge about project management, knowledge sharing and cultural differences, which are discussed in this section. It therefore builds upon prior research in these areas. To date, very little effort has been made to combine these fields in an interdisciplinary manner to analyze the EWSs.

2.1 Early Warnings Signs

The project troubles before the failure are hardly ever detected early enough in the IT industry (Havelka and Rajkumar, 2006). Therefore, identifying and managing those troubles at an early

stage provide an anticipatory framework (Nikander and Eloranta, 2001) to manage uncertainties in the critical early project stages, especially in the onshore-offshore project environment that is characterised with higher risks than in domestic project environment. It is known that corrective actions in the early project stages are cheaper than the costly recovery measures in the later stages (Ewusi-Mensah, 2003; Flowers, 1996) since the rework and retesting of the system will increase the project efforts, costs and time and lead to project failures.

Four major empirical works have studied the concept of EWSs (Kappelman et al., 2006; Havelka and Rajkumar, 2006; Nikander and Eloranta, 2001; Philip et al, 2010). Except Nikander and Eloranta (2001) who concentrated on industrial construction projects, all other works studied IT projects. As opposed to the works that studied EWSs during the whole project life cycle (Havelka and Rajkumar, 2006; Nikander and Eloranta, 2001), Kappelman et al.'s (2006) and Philip et al.'s (2010) work, focussed on the first 20 percent of the project lifecycle. Research about EWSs in offshore-outsourced projects by Philip et al. (2010) has revealed four main warning categories - communication, people, formal process and formal output related EWS (Philip et al. 2010). The offshore-specific EWSs found by Philip et al. (2010) were all in the category of communication. However, all these works were based on surveys that lacked in-depth analysis of OOSD projects.

Philip et al. (2010) found two main types of EWSs that affect the OOSD projects: offshore-specific and non-offshore specific EWSs. Offshore-specific EWSs are unique to offshore projects and require special attention in OSD projects. These issues result because of the unique characteristics of onshore-offshore project environment. Although non-offshore specific EWSs are not specific to OOSD projects they are indispensible for the success and require at least as much attention for offshore projects as in domestic projects. The presence of these EWSs of failures in project-management related areas indicated the relevance of formal control mechanisms to offset the disadvantages in terms of cultural differences and geographical distances.

2.2 Knowledge transfer

The concept of knowledge transfer is difficult to define, because there is no clear distinction between the sharing of knowledge and the creation of new knowledge (Bresman et al. 1999). Cross-boundary knowledge transfer is further challenged when is occurs virtually. In other words, when units are geographically dispersed they are heavily dependent on information and communication technology (Gibson et al. 2006).

Knowledge transfer tasks are classified as either **formal** (i.e., a planned task) or **informal** (Argote et al. 2000). It is customary to use the term "knowledge transfer" to refer to the sharing of knowledge between two distant units of a multinational company, between two different functional units at the same location, between a vendor and a client, or even between countries. The use of the word sharing implies flow: knowledge 'flows' from its primary holder to the receiver (Doz et al. 1997). In organizations knowledge transfer can be seen as the process through which one unit (e.g., team, group, department) is affected by the experience of another (Argote et al. 2000).

Knowledge transfer refers to the exchange of either expertise or external market information of global relevance but not to the transfer of internal administrative information (Gupta et al. 1991). In other words, knowledge transfer refers to the exchange of operational knowledge. This can be in the form of data, blueprints, parts, machines, or other means such as direct person-to-person communication (Doz et al. 1997).

Knowledge transfers are strategically important to organizations for several reasons. They transmit localized know-how from one sub-unit to other units in the organization. Knowledge transfers also facilitate the co-ordination of workflows linking multiple, geographically dispersed sub-units. Furthermore they can enable organizations to capitalise on business opportunities requiring the collaboration of several sub-units.

Offshore outsourcing situations present various challenges to companies with regard to knowledge transfer. Partners should be motivated to access and produce knowledge within the project, which means that relevant project knowledge has to be made accessible to those project members that need it. To do so, communication needs to be established between those who need and those who possess knowledge. To achieve this goal the company has to choose the best instruments of control, motivation and context (Balaji et al. 2005).

Successfully identifying, analysing, specifying, and documenting project-relevant knowledge is crucial; for offshore software development, it becomes even higher priority in terms of its effectual transfer across boundaries. Differences in location-specific work cultures like work ethic, importance of hierarchy, and mode of communication can impact the transfer of project relevant knowledge.

Knowledge can be split into explicit (codified and easy to transfer) and tacit knowledge. Tacit knowledge is difficult to articulate and is more challenging to transfer than explicit knowledge (Nonaka 1994). Similarly, knowledge that has not been codified is more difficult to transfer than codified knowledge (Zander et al. 1995).

Another aspect of knowledge is its "embeddedness". According to McGrath and Argote's framework, knowledge is embedded in three basic elements – members, tools, and tasks – and the various sub-networks formed by combining or crossing the basic elements. Members are the human components of organizations. Tools, including both hardware and software, are the technological component. Tasks reflect the organization's goals, intentions, and purposes (Argote et al. 2003; McGrath et al. 2001). Szulanski analyzed how characteristics of the source of knowledge, the recipient, the context, and the knowledge itself affected transfer (Szulanski 2000). Knowledge transfer must take into account embedded information especially during offshore software development (Nicholson et al. 2004).

Furthermore it is important to note that the quality and performance of embedded knowledge transfer is highly dependent on the level of trust and the quality of the relationship between the source and recipient (Griffith et al. 2003; Szulanski 1996). If the recipient doesn't trust the source, the knowledge acquisition will be questionable and if the source doesn't have a good relationship with the recipient the willingness to transfer background information and tacit knowledge will be troublesome.

Conveying project relevant knowledge to counterparts working in a geographically distant, culturally distant country can be a difficult task and is important to focus on.

2.3 Cultural distance

Culture plays an important role in any team activity's success and is associated with the knowledge sharing process and common understanding between team members. Understanding and dealing with cultural differences for the efficient transfer of project related knowledge is one of the motivations for our research. Furthermore, cultural compatibility is often described as an important factor in determining the success of international software development teams (Gallivan et al. 2005). A number of researchers have already investigated cross-cultural offshore projects (Gallivan et al. 2005; Krishna et al. 2004; Walsham 2002) and they suggest that the cultural approach in IT research needs to take a broader view on culture. Culture is a difficult topic to discuss and a limitation of cross-cultural work is that culture is constantly changing.

According to Hofstede (1980), "Culture is more often a source of conflict than of synergy. Cultural differences are a nuisance at best and often a disaster". Dealing with cultural difference in a project can be troublesome, but it shouldn't be considered as just a single influencing variable but rather as a set of variables that influence the project on multiple levels. This approach to understanding culture sees many different layers, including national, organizational, professional groups, and individuals. These are seen as being intertwined in a complex, non-hierarchical way (Gallivan et al. 2005; Karahanna et al. 2005).

This approach may be convenient for conceptualization, but it is very limited for practical purposes in the modern international business world. Hofstede furthermore points out that geographical separation and cultural differences can lead to quasi-autonomous sub-organizations which may lead to further problems of communication, co-ordination, control and motivation (Hofstede 1984b). Thus cultural differences within organizations should not be ignored when discussing knowledge transfer and can be regarded as one of the barriers between company divisions and local units. Knowledge transfer between project partners located in the same country can be troublesome enough, but it is clear that this problem becomes much more severe with geographical and cultural distance (Boden et al. 2009; Bresman et al. 1999).

Within knowledge sharing relationships between members of differing cultures, participants communicated less information than between members of the same cultural background. Li shows that communication between individuals in high-context countries and low-context countries differs significantly in the amount of information transferred (Li 1999). These differences in communication between high-context and low-context cultures lead to tremendous losses of relevant knowledge within the transfer process between these groups.

Contact and communication between different cultures is an inherent fact of offshoring, thus research on cross-cultural issues in this area is gaining more and more emphasis. Motivated by the immense potential negative influence of cross-cultural issues on performance as well as relationship building in software development projects (Carmel et al. 2005), even IS research is beginning to focus on culture. The common understanding of culture is that it is learned, associated with values and behaviours, shared by a group, and passed from one generation to the next (MacGregor et al. 2005).

To explain cultural differences, researchers make use of **dimensions** of national cultural variations. These dimensions are the specific aspects of a culture that can be measured in relation to other cultures (Hofstede et al. 2004). Hofstede provides an overview of the most popular cultural dimensions: power distance, individualism, uncertainty avoidance,

masculinity/femininity, and long/short term orientation. Referring to these dimensions helps to understand and explain why people from different cultures might behave and think differently. For the study of offshore software development, these dimensions can be a useful metric for understanding problems before they arise and analyzing why knowledge sharing can be so complicated between team members from different cultures.

Hofstede's work on culture has, however, been the subject of some criticism. According to McSweeney, he sees culture as a stable, monolithic concept; cultural groups are seen as homogeneous, ignoring the possibility of subcultures; and actors only interact in one culture at a time (McSweeney 2002). Although these points might have some validity, other scholars argue that managers and groups tend to identify strongly with their national values and thus this important source of culture cannot be ignored (Sahay et al. 2003).

We understand the criticism of Hofstede's work, but we find that he provides a useful framework for comparing cultures with each other. Whether or not his specific indices are applicable to reality is debateable and not within the scope of this paper.

3. Research Framework and Methodology

We have applied an exploratory case study research (Yin 2002) to analyze the EWSs of failures in OOSD project. Based on the literature review, we have developed a research framework (figure 1) that guided our analysis. The EWSs in OOSD projects appear as a combination of offshore-specific and offshore-indispensible (non-offshore specific) warning signs. They can be broadly divided into four categories: communication, culture (offshore-specific), knowledge transfer and project management (offshore-indispensible). The issues within a category might be linked as the literature review has shown. We will further explore the interrelations among all categories in this case study. The offshore-specific EWSs that are unique to OOSD projects result because of the unique characteristics of onshore-offshore project environment. The offshore-indispensible ones play a big role as well since the characteristics of OOSD projects require more formal and structured processes to manage the project management and knowledge transfer process than in domestic projects.

Offshore-specific EWSs	**Offshore-indispensible EWSs**
Communication issues	Knowledge transfer issues
Cultural issues	Project management issues

Figure 1: Research framework to study OOSD EWSs

Our research framework provides a mental framework for analyzing offshore project failures and EWSs. We applied this framework to a case study and examined the connections between the issues in the different categories.

Since there is a lack of qualitative field studies about OOSD project failures, we chose case study as our research methodology. This allows us to investigate a contemporary phenomenon within its real-life context where the relevant behavior cannot be manipulated (Yin 2002). We formulated the following research questions as the core of our research:

Which are the early warning signs that contribute to OOSD project failure? How are these warning signs interrelated?

Selecting the case was important, because we needed to get full access to a project on-site and off-site with the possibility of collecting as much data as necessary up to the level of "theoretical saturation" (Eisenhardt 1989). The case we selected offered an exclusive insight into an OOSD project in the Indo-German project environment.

The research was exploratory in nature and relied on an interpretive in-depth case study (Saunders et al. 2006; Yin 2002). The collection of data included interviews as primary sources and secondary information from email and instant messenger log files, which included documents and questionnaires regarding software development which we correlated (Yin 2002).

The interviews and data collection were conducted primarily in a first round between June and August 2008. The interviews lasted 45 to 90 minutes and involved both the client (4 interviewees) and the vendor (7 interviewees). The interviews were semi-structured to allow flexibility and to ensure that the researchers captured any interesting phenomena (Saunders et al. 2006). The interviews were conducted with senior management, project managers, and developers of each company together with a review of project documentation, emails, IM logs and formal presentation material. During this round of interviews we were able to visit the vendor in India and conducted the interviews with managers and developers onsite. This visit brought an additional insight to the research material, because we were able to observe and talk to the developers in real-life conditions.

Additionally, we conducted a second round of interviews during November 2008 when we realized from our analysis that we needed additional data and more focus on the identified concepts and categories. During the second round we visited the UK for more focused interviews with the managers to discuss the themes and categories from the first round of analysis. In total the data gathered from client and vendor includes approximately 40 hours of interviews, most of which was transcribed. The transcripts, together with the field notes and secondary data built a rich basis for this research project.

In the tradition of explorative research, our goal was not to test theoretical propositions, but to develop a theoretical contribution (Eisenhardt 1989).

In the first phase of analysis we sorted the interviews, personal notes, and secondary data from the first round of interviews to write contact summary sheets and a chronology of the project. With the help of the summary sheets we classified and coded interviews and the secondary material (e.g. documents, emails and IM logs). After coding the material we analyzed the codes and tried to built themes and categories upon it. After completion the first round of analysis, we

entered a sequence of analysis cycles where we analyzed the data (field notes, coding, displaying data, conclusions) and searched for extended literature from related fields for relevant concepts and categories. As a result of the analysis process four EWS categories and their relationships become apparent: communication, culture, knowledge transfer and project management. Based on these categories we narrowed our interview guideline for the second round of interviews.

4. Case description

The project took place in late 2007 and consisted of a German software company (**client**) that contracted a web development project to a service provider (**vendor**) situated in Bangalore, India. The client had decided to explore the possibilities of outsourcing, and so chose the extension of an existing proprietary software system as a pilot project with a new vendor. This was the client's first attempt at outsourcing. The goal was to develop a new sub-module adding more flexibility to an existing content management system (CMS). The vendor saw it as a good opportunity to establish a potential long-term relationship via a smaller scope project.

Before the project started, the client manager and project manager traveled to the UK to meet with the vendor's key account manager. During the meeting, the client and vendor established the scope and the client agreed to send source code to the client so that they could submit a bid on the project. The vendor was not previously familiar with the software system.

The client project manager (**CPM**) emailed the source code to the vendor project manager (**VPM**) in Bangalore, and exchanged a few emails discussing the preferred composition of the vendor team by looking through developer CVs. After the team was selected, the client developer (**CD**) assisted the vendor developers (**VDs**) with installing the system. After the system was installed, the CD and VDs took part in an informal training session about basic usage of the system, during which the VDs asked questions which were answered by the CD.

Two weeks later, the VPM provided the CPM with an analysis of the existing system. The vendor then responded with a fixed-price bid for the project and a timeline of three months. There were no clarification questions submitted by the vendor at this point. Both parties agreed that the CD would support the VDs when they had any questions.

The vendor also set up a project management tool accessible by the client. This allowed the client to see the status of the project and handle issues, and was designed to speed up the flow of information especially during the delivery phase. The VD's manger described the advantages of such a tool as follows:

> *"To facilitate the time and distance challenges of the project, we will set-up a Project Management Office (PMO), which will provide delivery oversight for the project engagement. The PMO provides specialized services in project start up, project management, project control and tracking, project audit, software quality assurance and offshore/onsite coordination to ensure successful technical delivery of projects."*

During the first two months of development, the CD received a few clarification questions from the VDs, but there was otherwise little communication in either direction. At about the two-month point, the vendor provided a login to the client to their internal system, and the client was able to check the process of the sub-module. To the client's dismay, the module was barely functional and they began to have serious doubts about the success of the project. Due to the

results of the client testing, the vendor decided to push back the final release of the project to an undetermined date, despite the client's desire to know a specific timeframe.

During this phase, lasting around three extra months, the VDs had a large number of questions that they submitted directly to the CD. The vendor prepared a second release, which was likewise unacceptably nonfunctional and had developed further technical problems.

After the second release, the CPM began to apply increasing pressure on the VPM, expressing serious concerns about the ability of the vendor to finish the project at all. The vendor then extended the deadline once more. After an additional three months, the vendor general manager stepped in and signaled their inability to finish and both parties agreed to cancel the project.

5. Case Analysis

We found the major offshore-specific and offshore-indispensible EWSs prior to the failure of the analyzed case. The results are discussed in this section. Based on this analysis, we develop a preliminary model to understand the linkages between the issues that appear as EWSs of failure.

5.1 Offshore-specific EWS

The communication processes within the project were not clearly specified in the beginning. Both the client and vendor agreed to keep in touch through the instant messenger skype. The development works were agreed to be delivered according to the specifications of CMMI Level 5. Although the development took place according to the specifications, the communication processes were not transparent to the client. The client was not invited to the project meetings of the vendor. No information about meetings or discussions on the client site was conveyed to the vendor and the vendor got the impression of a long communication break. The project had a common development platform; however, it was not for the client whether the vendor was working on the project. Only after the poor results of the first deliverables did the both sides agree to communicate more openly.

The use of an instant messenger as the primary communication medium has allowed the teams to communicate across time-zones. However, the lack of effective project management of both teams by disseminating the correct information between the teams led to a communication gap, which was closed late for the project to be finished according to the specifications.

The two project partners were culturally diverse in many important aspects. The client team had a very flat hierarchy and was composed of highly individualistic members. The vendor team, on the other hand, had a very rigid structure and was made up of team members that were not allowed to make decisions without consulting several layers of hierarchy. The client team was extremely focused on receiving direct yes or no answers, while the vendor team usually tried to present a positive impression by including a lot of background information that was perceived as unnecessary by the client. Using the Hall framework, we would classify the client team as low-context and the vendor team as high-context. The other differences correspond closely to the Hofstede dimensions of power distance and individualism vs. collectivism.

An interesting observation is that across the culturally diverse teams there was a sub-group that appeared to share a common culture. When the developers from both client and vendor teams

were allowed to communicate directly, they appeared to share enough common practices and knowledge that their cultural values played a smaller role and they were able to communicate quickly and effectively. On the other hand, the project managers, despite sharing some common practices, did not appear to communicate any more or less effectively. The assumption is that the project managers are more affected by cultural values whereas the developers more by their practices.

The differences between the two teams were not initially apparent during the explicit knowledge transfer phase. In fact, the differences played virtually no role during the initial phase. The vendor had a very explicit quality assurance process for transferring documentation and requirements, which was followed without any problems.

Identified EWS: Lack of transparency and openness in communication

The VDs have apparently not understood all the configuration details of the CMS and they did not enquire about the details from the client. In the first phase, the CMS was introduced to the vendor through a videoconference and the installation took place together with the vendor and client teams. The VDs have acknowledged that they understood the system well; however, it was found later that some of the basic principles were not understood well. The VDs did not want to ask "silly" questions and pester the client. Until the delivery of the first milestone, there were practically no questions and the client assumed that everything was fine. The client project manager has commented the following: "I was wondering why they never contacted me on critical issues although I had the feeling that something was going wrong. I then changed my tactic to ask them directly on the status whereas I always found out somehow what went wrong."

The lack of questions from the vendor resulted mainly because of the differences in cultural attitudes. As opposed to the German side, the Indians did not want to give a wrong impression by asking wrong questions and thus did not communicate openly. One of the vendor developer also noticed that very few questions were asked, although he himself understood and assumed that the other developers have understood the functionalities of the system. The German side noticed the results only after the first deliverables arrived, which has already put the project in the wrong track.

Identified EWS: Lack of questions in the requirements phase

5.2 Non-offshore specific EWS

The CMS code was transferred to the vendor by the client after the kick-off. However, because of the lack of clear business specifications, the VDs could not analyze the code correctly and implement it. Further, the specifications appeared ambiguous for the vendor at some points and this has affected the delivery of the system. No project management measures were put in place to analyze the requirements and impart them to the VDs at the right time. This was noticed only once the first version of the CMS implementation was tested.

Identified EWS: Unclear and ambiguous business specifications

As a result of inadequate analysis in the requirements phase the requirements became clearer only during the course of the project. The vendor could not analyze the requirements and compare them with the available functionalities of the CMS since it was the first project of the vendor with the particular system. The vendor at some point even had confusion about the acronyms CMS and CRM (Customer Relationship Management). The vendor has focused on the technical requirements and has not reconciled with the available functionalities of the CMT.

Identified EWS: Misunderstanding of requirements

The vendor company was acquainted with the CMS. The CVs of the developers have also shown the experience of the VDs with the CMS. However, not all VDs in the projects were expert system implementers and the senior developer, who was supposed to take part in the project, was not included in the team. The technical skills of the employed developers were not adequate to implement the product correctly. This has resulted in unsatisfactory implementation of the CMS and it was only noticed after the delivery in the first milestone. The VDs have admitted later that they have underestimated the complexity of the project and lacked the experiences to implement the system as required.

The client project manager has remarked the following about the competency of the vendor: " …after several days on his part trying to solve a particular problem the vendor developer declared a certain task impossible when I knew it would be quite easy to accomplish. Using a web browser and typing the three keywords into Google gave the correct solution ranking first. So I sent him the article I found and an example of how to accomplish that particular task. I did not get an answer to that email but the next email merely stated the problem had been addressed…".

The competency to transfer the technical skills in the project also seems to be overlooked in OOSD projects. We have found that although the vendors appear competent to implement the project, they might lack the right personnel to apply the skills in the offshore environment. Although the VDs have acquired the skills necessary to fulfil the tasks, they lacked the competency to convert the skills into deliverables. The terms "skills" and "competencies" are often used interchangeably in the literature, but they are not necessarily synonymous. Skills can be understood as the ability to perform a task that is acquired from one's knowledge and practice, whereas competency can be considered as any underlying characteristic required for performing a given task, activity, or role successfully. Competency may take the following forms: knowledge, attitude, skill and other characteristics of an individual including motives, values, self concept etc.

Identified EWS: Lack of required technical skills and competencies

6. Preliminary Model and Conclusions

We have analyzed a failed project case in offshore outsourced software development (OOSD) and gained insights about the early warning signs (EWS) before the failure. This case analysis provided exclusive insights as we had access to failure data from both client and vendor perspectives to analyze the case from the team perspective.

We believe that our contribution from this study is to show the direct connection between several related fields and to present a distinct mental model for analyzing this connection. Figure 2 depicts a preliminary model that provides insights into the EWSs of failures in OOSD project and their interrelations.

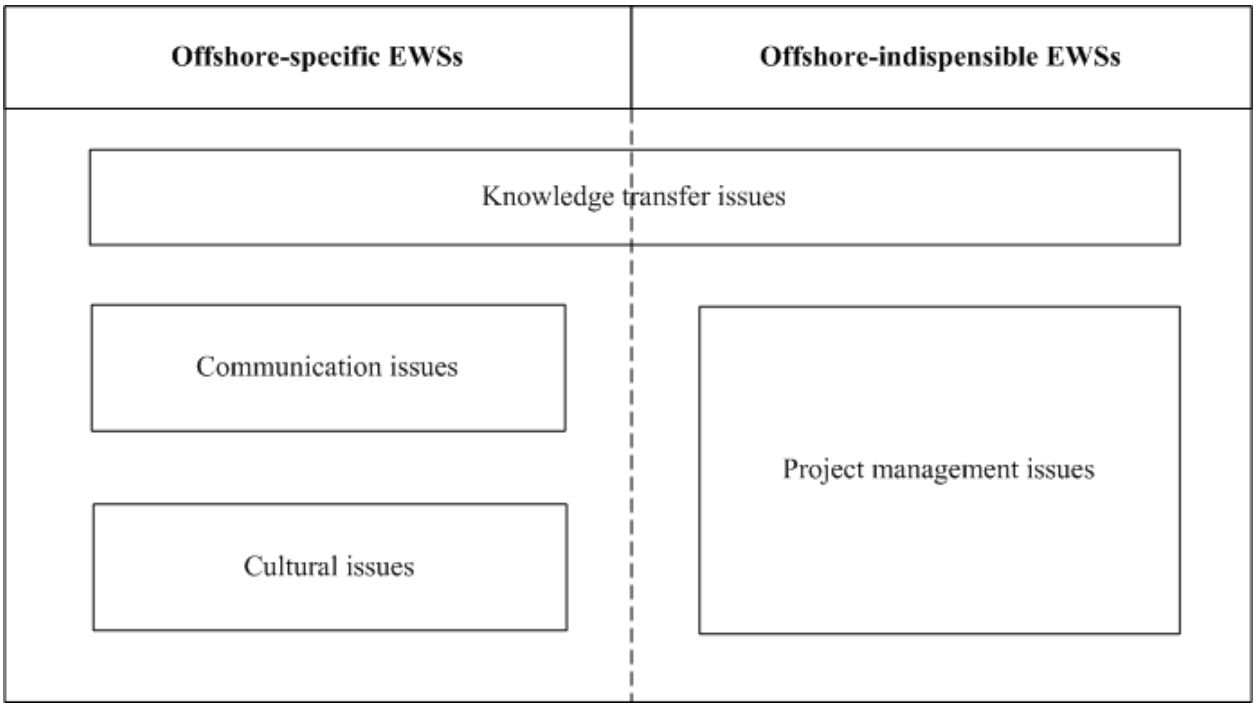

Figure 2: Preliminary model of the relation among EWSs

The EWSs in OOSD projects appear as a combination of offshore-specific and offshore-indispensible EWSs. The presence of non-offshore specific EWSs or offshore-indispensible EWSs suggests the necessity of more formal and structured processes to avoid project failures in OOSD projects. The failure analysis has found that the issues related with culture form the basis of many problems. They further affect the communication process and thus the knowledge transfer. Knowledge transfer was found be important to explain the offshore-indispensible EWSs as well. This chain of issues that show up as EWSs leading to failures was a new finding found from the case study analysis. The understanding of the event chains is relevant as it will help to give enough emphasis to particular risks based on their weightage and occurrence in OOSD projects. The project management processes were found to have affected the knowledge transfer process. Efficient knowledge sharing and transfer process was found to be highly relevant for the successful completion of OOSD projects.

Although this model is based on one case study, which is a weakness of this work, we have combined different research fields in an OOSD project to produce a preliminary model. In the next step, we will further analyze the case deeply for more EWSs and then triangulate with the existing theories in IS research to reflect on our findings and also search for new phenomena. The linkages between issues have to be formulated explicitly with propositions and a full-fledged theory about the EWSs will be developed. This substantive theory will help to explain linkage of the EWSs that show up prior to failure and the OSD project failures.

References

Apte, U. and Mason, R. “Global disaggregation of information-intensive services”, *Management science*, 41, 7, 1995, 1250-1262.

Argote, L., and Ingram, P. "Knowledge Transfer: A Basis for Competitive Advantage in Firms," *Organizational Behavior and Human Decision Processes* (82:1) 2000, p 19.

Argote, L., McEvily, B., and Reagans, R. "Managing Knowledge in Organizations: An Integrative Framework and Review of Emerging Themes," *Management Science* (49:4) 2003.

Bagchi, K., and Kirs, P. "The Impact of Schwartz’s Cultural Value Types on ICT Use: A Multi-National Individual-Level Analysis," in: *International Conference on Information Systems*, 2009, pp. 1-19.

Balaji, S., Ahuja, M.K., and Ranganathan, C. "Offshore Software Projects: Assessing the Effect of Knowledge Transfer Requirements and ISD Capability," in: *Hawai'i International Conference on System Sciences*, 2005.

Boden, A., Avram, G., Bannon, L., and Wulf, V. "Knowledge Management in Distributed Software Development Teams – Does Culture Matter?," in: *International Conference on Global Software Engineering*, 2009, pp. 18-27.

Bresman, H., Birkinshaw, J., and Nobel, R. "Knowledge Transfer in International Acquisitions," *Journal of International Business Studies* (30:3) 1999, pp 439 - 462.

Carmel, E., and Tija, P. Offshoring information technology : sourcing and outsourcing to a global workforce Cambridge University Press, Cambridge, 2005.

Daft, R.L., and Lengel, R.H. "Organizational Information Requirements, Media Richness and Structural Design," *Management Science* (32:5) 1986, pp 554-571.

Dennis, A.R., Fuller, R.M., and Valacich, J.S. "Media, tasks, and communication processes: A theory of media synchronicity," *MIS Quarterly* (32:3) 2008, pp 575-600.

Desouza, K.C., Awazu, Y., and Baloh, P. "Managing Knowledge in Global Software Development Efforts: Issues and Practices," *Software, IEEE* (23:5) 2006, pp 30 - 37.

Dhanaraj, C., Lyles, M., Steensma, H., and Tihanyi, L. "Managing Tacit and Explicit Knowledge Transfer in IJVs: The Role of Relational Embeddedness and the Impact on Performance," *Journal of International Business Studies* (35:5) 2004, pp 428-442.

Dibbern, J., Winkler, J. and Heinzl, A. "Explaining variations in client extra costs between software projects offshored to India", *MIS Quarterly*, 32, 2, 2008, 333-366.

Doz, Y., and Santos, J.F.P. "On the Management of Knowledge: From the Transparency of Collocation and Co-setting to the Quandary of Dispersion and Differentiation," INSEAD, Fontainebleau, France.

Eisenhardt, K.M. "Building theories from case study research," *Academy of Management Review* (14:4) 1989, pp 532-550.

Eisenhardt, K.M., and Graebner, M. "Theory building from cases: Opportunities and challenges," *Academy of Management Journal* (50:1) 2007, pp 25-32.

Gallivan, M., and Srite, M. "Information technology and culture: Identifying fragmentary and holistic perspectives of culture," *Information and Organization* (15:4) 2005, pp 295-338.

Gibson, C.B., and Gibbs, J.L. "Unpacking the Concept of Virtuality: The Effects of Geographic Dispersion, Electronic Dependence, Dynamic Structure, and National Diversity on Team Innovation," *Administrative Science Quarterly* (51:3) 2006, pp 451-495.

Griffith, T.L., Sawyer, J., and Neale, M. "Virtualness and Knowledge in Teams: Managing the Love Triangle of Organizations, Individuals, and Information Technology," *MIS Quarterly* (27:2) 2003.

Gupta, A.K., and Govindarajan, V. "Knowledge Flows and the Structure of Control within Multinational Corporations," *Academy of Management Review* (16:4) 1991, pp 768 - 792.

Hall, E.T. *Beyond Culture* Anchor Books, Garden City, N.Y., 1976.

Havelka, D. and Rajkumar, T. "Using the troubled project recovery framework: problem recognition and decision to recover", *E-Service journal*, 5, 1, 2006, 43-73.

Heeks, R., Krisha, S., Nicholson, B. and Sahay, S. "Synching or sinking: global software outsourcing relationships", *IEEE software*, 18, 2, 2001, 4-60.

Hoch, D., Roeding, C., Purkert, G., Linder, S. and Müller, R. *Secrets of software success*, Harvard business press, Boston, 2000.

Hofstede, G. *Culture's Consequences, International Differences in Work-Related Values.* Sage Publications, Beverly Hills, 1980.

Hofstede, G. "The Cultural Relativity of the Quality of Life Concept," *Academy of Management Review*), Jul 1 1984a, pp 389-398.

Hofstede, G. Cultures Consequences : International Differences in Work-Related Values Sage Publications, London, 1984b.

Hofstede, G., and Hofstede, G.J. *Cultures and Organizations: Software of the Mind*, (2 ed.) McGraw-Hill, 2004.

Jarvenpaa, S.L., Knoll, K., and Leidner, D.E. "Is Anybody Out There? Antecedents of Trust in Global Virtual Teams," *Journal of Management Information Systems* (14:4) 1998, pp 29-64.

Kappelman, L., McKeeman, R. and Zhang, L. "Early warning signs of IT project failure: The dominant dozen", *Information systems management*, 23, 4, 2006, 31-36.

Karahanna, E., Evaristo, J.R., and Srite, M. "Levels of Culture and Individual Behavior: An Integrative Perspective," *Journal of Global Information Management* (13:2) 2005, pp 1-20.

Krishna, S., Sahay, S., and Walsham, G. "Managing cross-cultural issues in global software outsourcing," *Communications of the ACM* (47:4) 2004, pp 62-66.

Li, H.Z. "Communicating information in conversations: a cross-cultural comparison," *International Journal of Intercultural Relations* (23:3) 1999, pp 387-409.

MacGregor, E., Hsieh, Y., and Kruchten, P. "Cultural patterns in software process mishaps: incidents in global projects," in: *Hawai'i International Conference on System Sciences*, 2005.

Majchrzak, A., Beath, C.M., Lim, R., and Chin, W.W. "Managing client dialogues during information systems design to facilitate client learning," *MIS Quarterly* (29:4) 2005, pp 653-672.

McGrath, J.E. "Time, Interaction, and Performance (TIP) A Theory of Groups," *Small Group Research* (22:2) 1991, pp 147-174.

McGrath, J.E., and Argote, L. "Group Processes in Organizational Contexts," in: *Blackwell Handbook of Social Psychology: Group Processes,* R.S.T. Michael A. Hogg (ed.), Blackwell Publishing Ltd., Malden, MA, USA, 2001, pp. 603-627.

McSweeney, B. "Hofstede's model of national cultural differences and their consequences: A triumph of faith - a failure of analysis," *Human Relations* (55:1) 2002, pp 89-118.

Miles, M.B., and Huberman, M. *Qualitative Data Analysis: An Expanded Sourcebook*, (2nd ed.) Sage Publications, Inc, Thousend Oaks, CA, USA, 1994, p. 352.

Nakatsu, R. and Iacovou, C. "A comparative study of important risk factors involved in offshore and domestic outsourcing of software development projects: A two-panel Delphi study", *Information & Management,* 46, 1, 2009, 57–68.

Nicholson, B., and Sahay, S. "Embedded knowledge and offshore software development," *Information and Organization* (14:4) 2004, pp 329–365.

Nikander, I. and Eloranta, E. "Project management by early warnings", *International journal of project management,* 19, 7, 2001, 385-399.

Nonaka, I. "A Dynamic Theory of Organizational Knowledge Creation," *Organization Science* (5:1) 1994, pp 14-37.

Pauleen, D., and Yoong, P. "Facilitating virtual team relationships via Internet and conventional communication channels," *Internet Research: Electronic Networking Applications and Policy* (11:3) 2001a, pp 190-202.

Pauleen, D., and Yoong, P. "Relationship building and the use of ICT in boundary-crossing virtual teams: a facilitators …," *Journal of Information Technology* (16) 2001b, pp 205-220.

Pinto, K. and Mantel, S. "The causes of project failure", *IEEE transactions on engineering management*, 37, 4, 1990, 269-276.

Philip, T., Schwabe, G., and Wende, E. "Identifying Early Warning Signs of Failures in Offshore Software Development Projects – A Delphi survey", in *Proceedings of the Sixteenth Americas Conference on Information Systems*, Lima, Peru, August 12-15, 2010.

Ramachandran, S. "Effect of Cultural Norms on Media Choice in Global Virtual Teams," in: *AMCIS 2005*, 2005, pp. 1-8.

Sahay, S., Nicholson, B., and Krishna, S. *Global IT Outsourcing: Software Development across Borders* Cambridge University Press, Cambridge, UK, 2003.

Saunders, M., Thornhill, A., and Lewis, P. *Research Methods for Business Students*, (4 ed.) Prentice Hall, Upper Saddle River, NJ, USA, 2006, p. 656.

Snyder, J.L., and Lee-Partridge, J.E. "Understanding Choice of Information and Communication Channels in Knowledge Sharing," in: *International Conference on Information Systems*, 2009, pp. 1-10.

Staples, D., and Jarvenpaa, S.L. "Using electronic media for information sharing activities: a replication and extension," in: *International Conference on Information Systems*, 2000, pp. 117-133.

Stellman, A., and Greene, J. *Applied Software Project Management* O'Reilly Media, Sebastopol, CA, USA, 2005.

Szulanski, G. "Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm," *Strategic Management Journal* (17) 1996, pp 27-43.

Szulanski, G. "The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness," *Organizational Behavior and Human Decision Processes* (82:1) 2000, pp 9-27.

Takeuchi, H., and Nonaka, I. *Hitotsubashi on Knowledge Management* Wiley, Hoboken, NJ, USA, 2004, p. 250.

Vashistha, A. and Vashistha, A. The offshore nation, McGraw Hill, 2006.

Walsham, G. "Cross-Cultural Software Production and Use: A Structurational Analysis," *MIS Quarterly* (26:4) 2002, pp 359-380.
Walsham, G. "Doing interpretive research," *European Journal of Information Systems* (15:3) 2006, pp 320-330.
Walz, D.B., Elam, J.J., and Curtis, B. "Inside a software design team: Knowledge acquisition, sharing and integration," *Communications of the ACM* (36:10) 1993, pp 63-77.
Yin, R.K. Case Study Research: Design and Methods, Third Edition, Applied Social Research Methods Series, Vol 5, (3rd ed.) Sage Publications, Inc, 2002, p. 200.
Zander, U., and Kogut, B. "Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities: An Empirical Test," *Organization Science* (6:1) 1995, p 16.